Modeling of water management and hydrological properties of orchards

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Our investigation was carried out at an micro-irrigated intensive apple orchard in Eastern part of Hungary and an 80 hectare Bosc and Williams pear orchard in the South Western part of Hungary. in 2010. The aims of the study were to monitor the effect of a compacted layer and soil physical parameters on soil water regime, supporting the water management of the orchard on hillsides and to reduce the effect of high precipitation intensity on orchards. The total drainable water regime is 920 m3 ha-1 from the upper 40cm soil layer and 1460 m3 ha-1 from the upper 70 cm soil layer. This amount of water should have been drained several times in 2010 to prevent the orchard from the negative effect of surplus water. Since the conventional horizontal drainage system can damage the present apple orchard significantly, the harmful surplus water can be infiltrated by the loosening of the compacted soil layer in the 50-70 cm depth or led off by vertical drainage. Therefore one, solo knife coulter is suggested to use at 80-90cm depth. In the case of the hillside a possible replantation of the orchard, pear trees should be planted along the contour lines, so as to avoid erosion and tree damage caused by water erosion. The irrigation of the orchard would be much easier in this case due to better establishment of the irrigation system and lower pipe-line pressure lost. To decrease the effect of erosion, the levels of the existing farm tracks have to be developed with reverse gradient. With the present situation, distributing small dosse of fertilizer should be utilized at the ridge spots, while in the case of convex parts of the valley, smaller doses of nutrients should be used. These digital data can be the basis for a precision spatial decision support system.